Incorporating GIS into the Development of Community-Based Index Models to Better Capture the Watershed Response to Proposed Planning Designs

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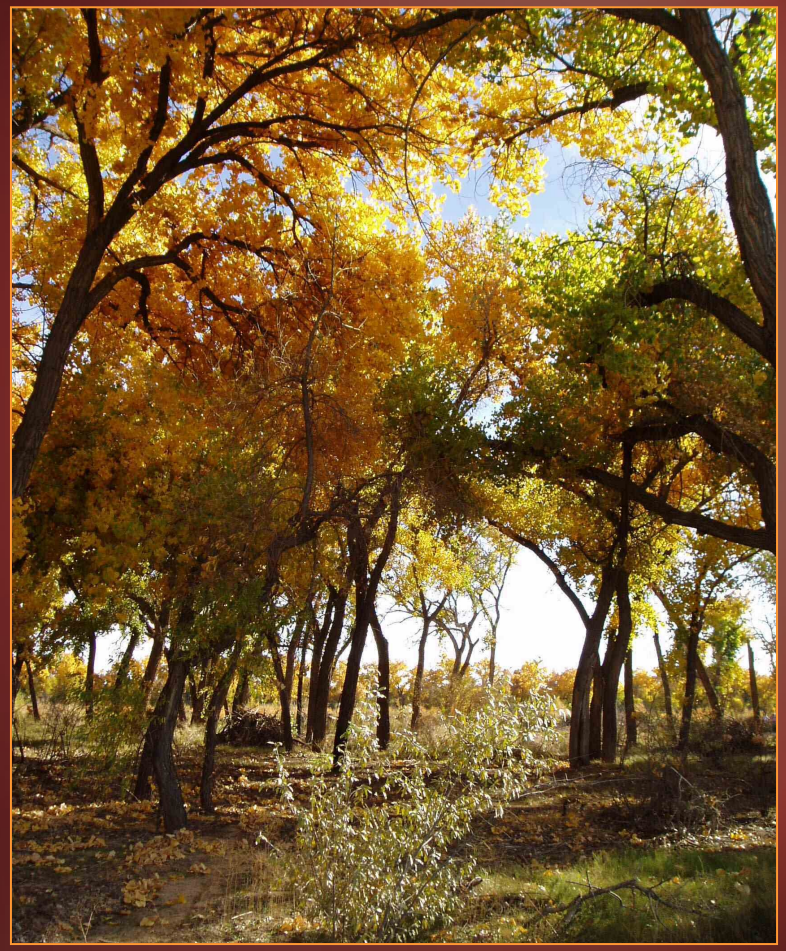
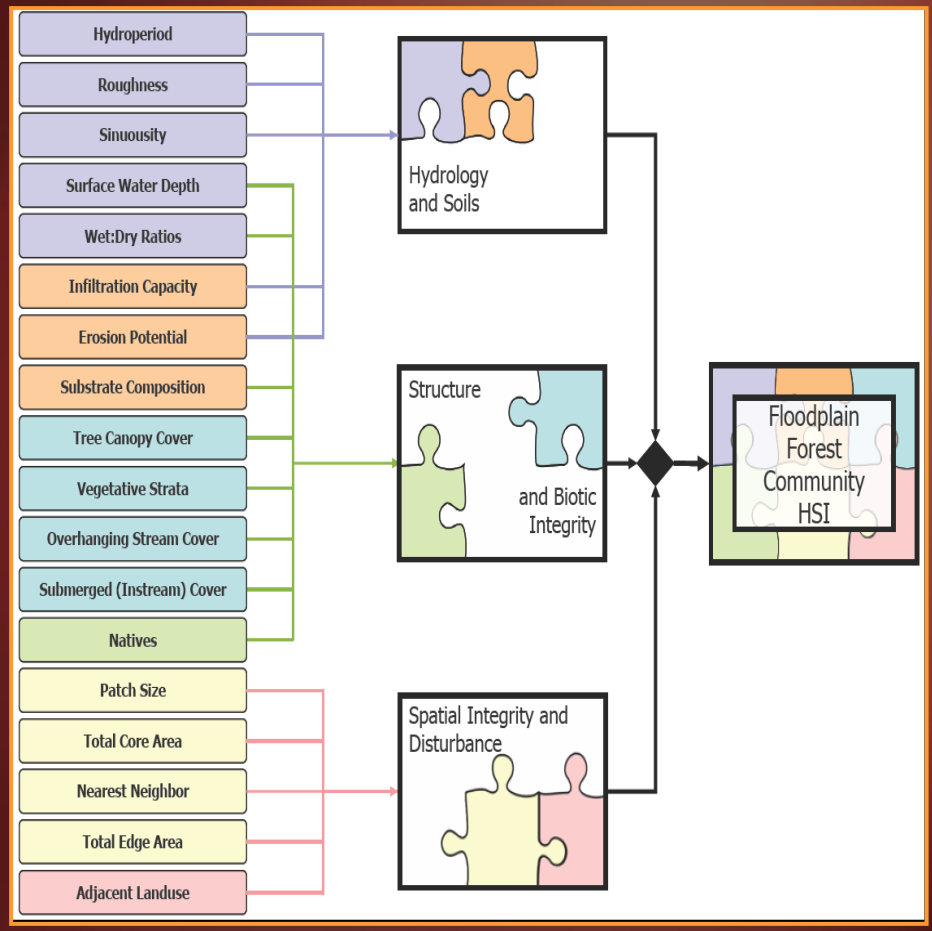
Ongoing Corps Efforts

- **The development of community-based index models is a new approach designed to capture the ecosystem integrity of the systems of concern**



Ongoing Corps Efforts

- **The community-based approach focuses on key ecosystem components:**
  - **Hydrology**
  - **Soils**
  - **Structure**
  - **Biotic Integrity**
  - **Spatial Integrity**
  - **Disturbance**



Building Better Models

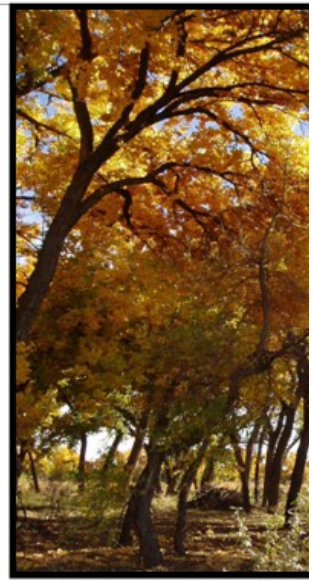
ERDC/LAB TR-0X-X

Insert Name of ERDC Laboratory or the Center

System-Wide Water Resources Program

An Approach to Devel Models to Assess Ecc System-Wide Scale

Kelly A. Burks-Copes, Antisa C. Webb, a



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System-Wide Water Resources Program

Development of a Rip Model for the Middle New Tool for Ecosyste

Kelly A. Burks-Copes, Antisa C. Webb and Seth Jones

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Environmental Laboratory

US Army Corps of Engineers®
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Coupling Conceptual Models with Community Index Models

A Case Study in the Clear Creek Watershed, Texas, USA

Kelly A. Burks-Copes, Antisa C. Webb, and Andrea K. Catanzaro

September 2007

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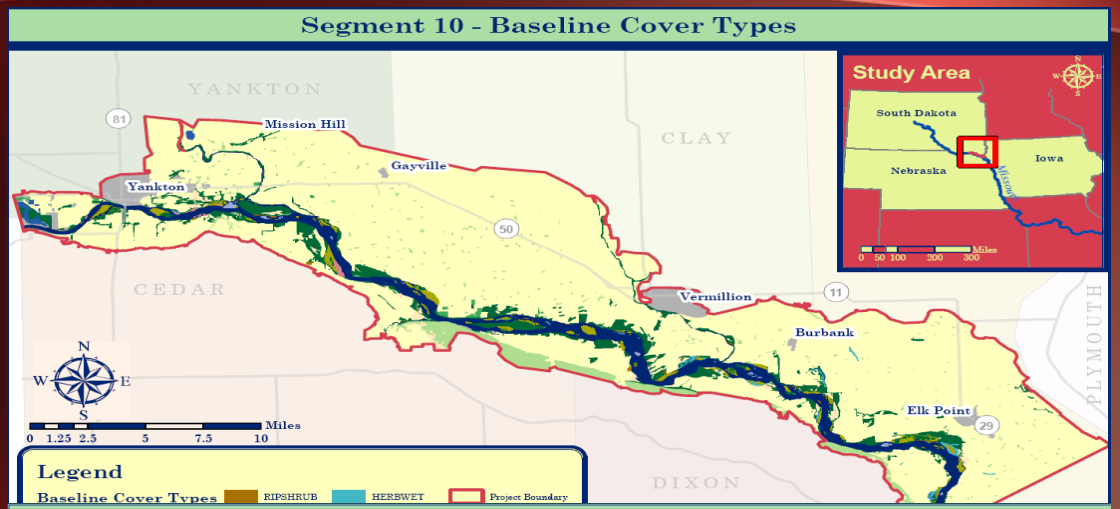
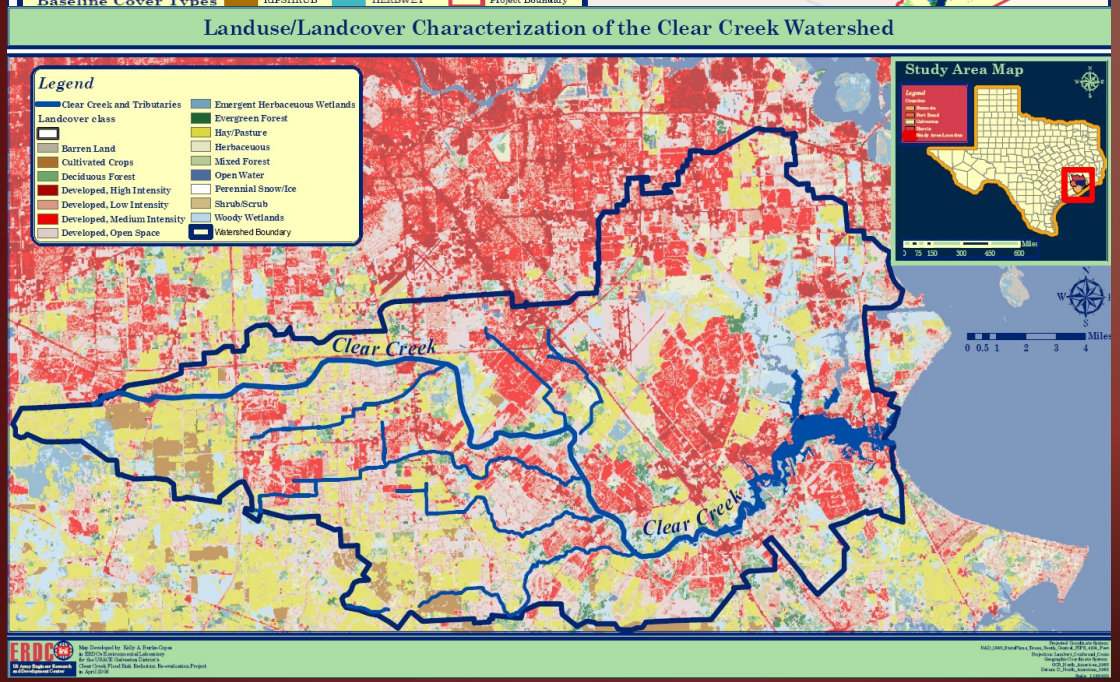
Common Model Parameters – Landscape-level Metrics

- Total Edge
- Edge Density
- Total Core Area
- Number of Core Areas
- Core Area Distributions
- Patch Distribution and Isolation
- Diversity & Evenness Indices
- Landscape Shape Index
- Patch Size and Density
- Largest Patch Index
- Contagion
- Connectivity
- Proximity Index
- Aggregation Index
- Adjacent Land Use
- Interspersion and Juxtaposition
- Types of Human Disturbance
- Landscape Division Index
- Similarity Index
- Buffering

A Cool Tool – The Patch Calculator

- The tool automates many of the metrics needed to assess community's at the landscape level
- The outputs are transferable to MS Excel
- Some (but not all) of the metrics have been tested on real studies:
  - Clear Creek Flood Risk Management Study (Galveston District)
  - Missouri Rec River BiOp (Kansas City and Omaha Districts)
  - Middle Rio Grande Ecosystem Restoration Study (Albuquerque District)

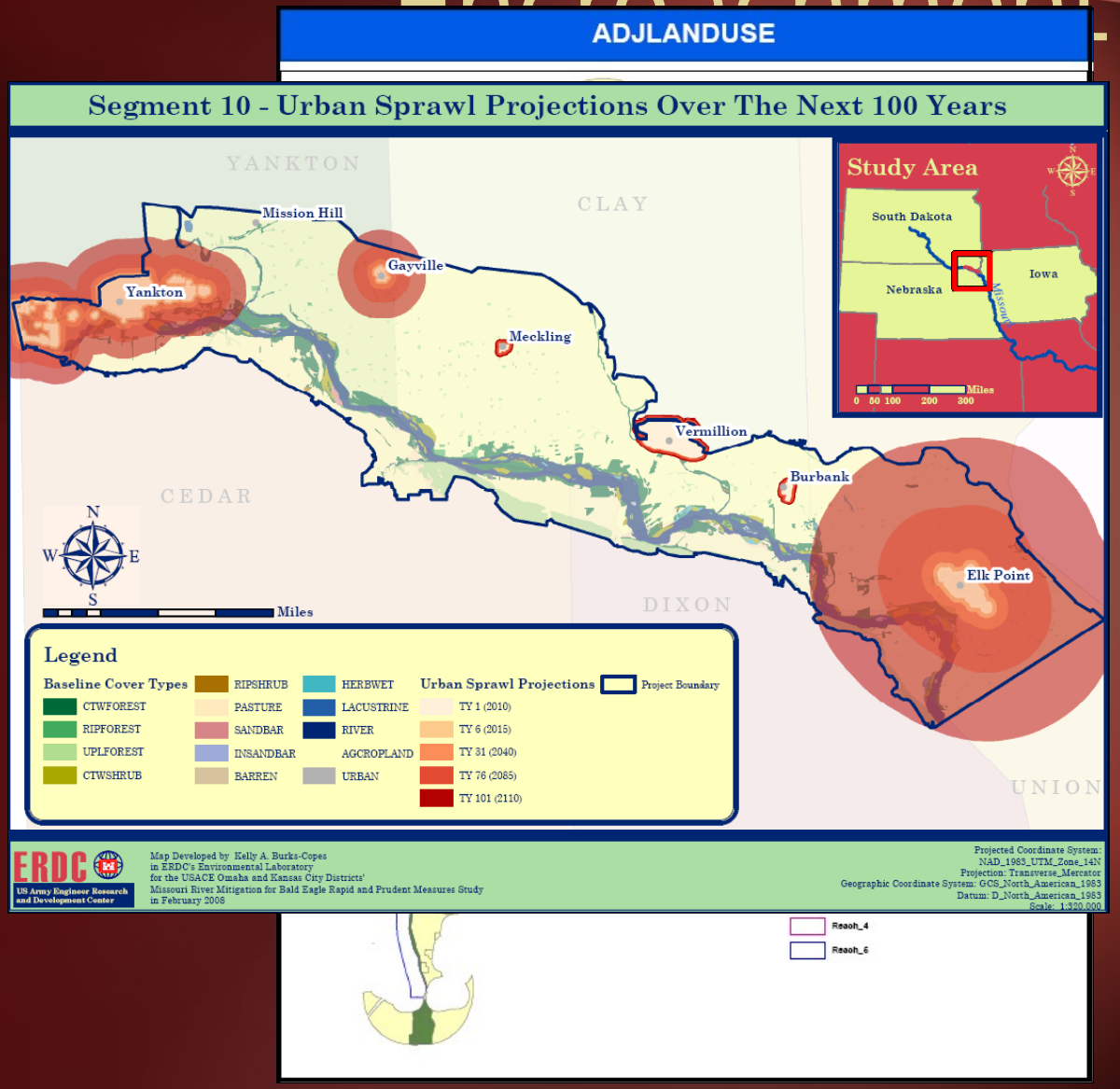




http://el.erdc.usace.army.mil/elpubs/pdf/em07.

Without-Project Urban Encroachment

- Using Census Data and and LULC to Forecast Urban Encroachment
- Can be refined with Parcel Data

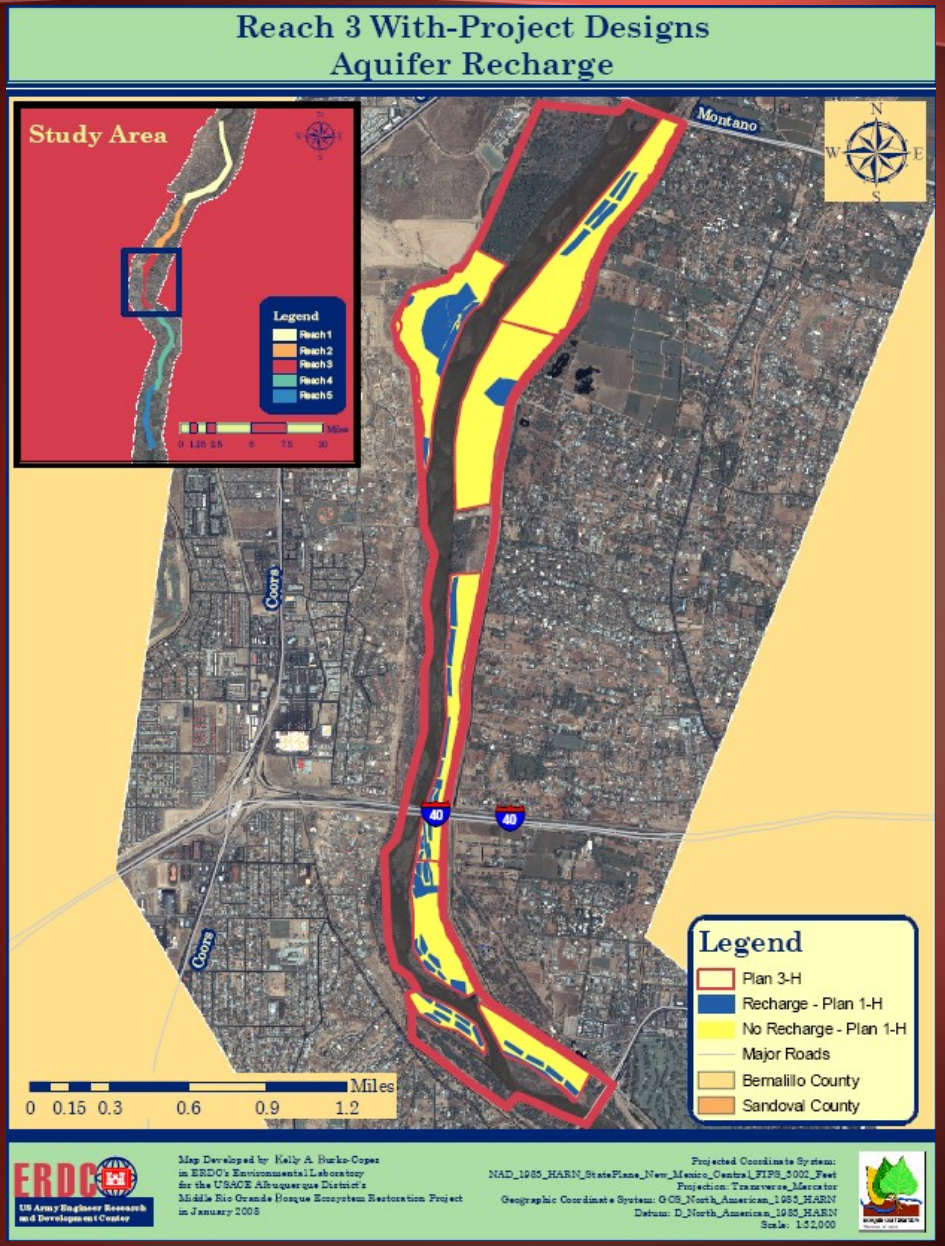


Spatial Heterogeneity and/or Biotic y

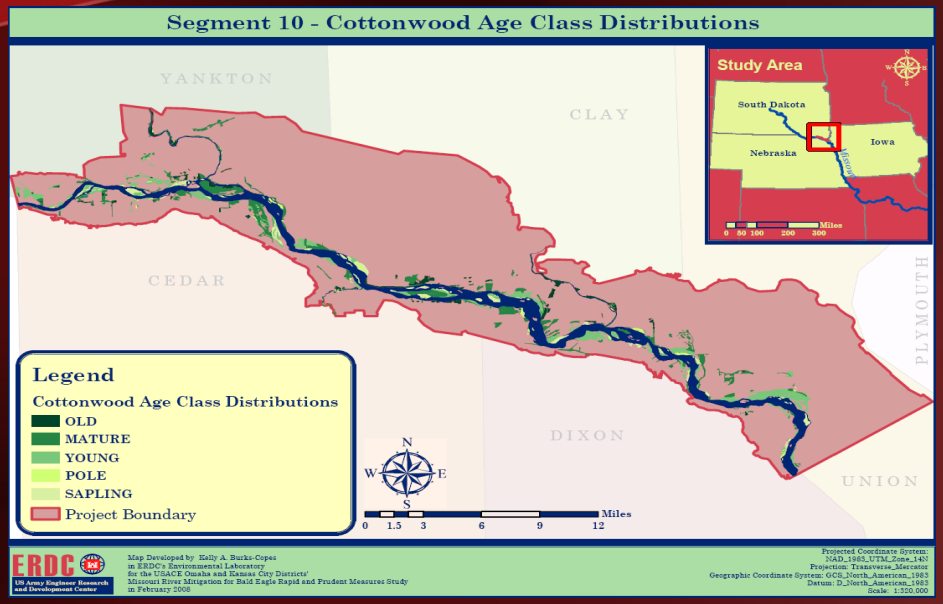
- **Using Spatial Analyst in ArcGIS 9.2**
  - **Neighborhood Statistics**
    - **Variety**
- **Model Builder will automate the process for the District**

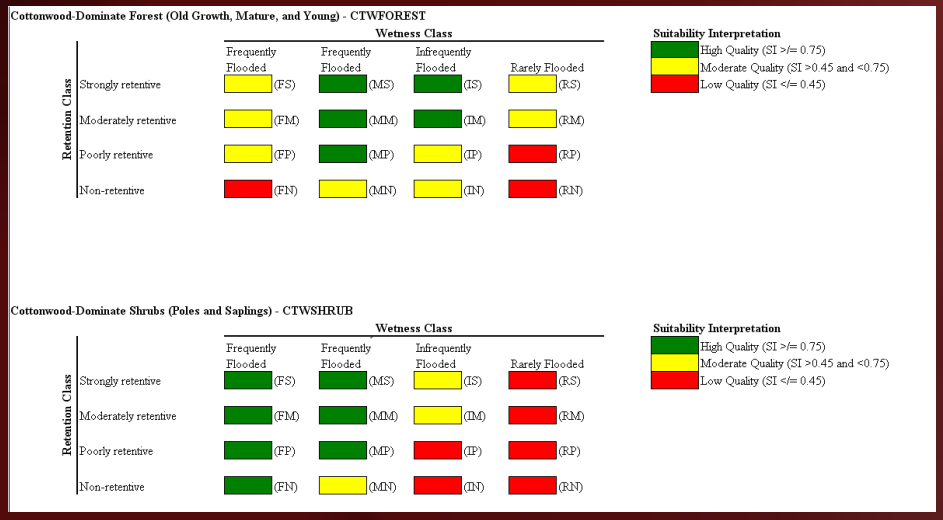
Capturing Ecosystem Services

- Environmental Benefit Indicators (EBI) (Boyd and Wainger 2002)
- Aquifer Recharge
- Education
- Natural and Cultural Integrity
- Access



Land Capacity Potential Index




Cottonwood-Dominate Forest (Old Growth, Mature, and Young) - CTWFOREST
Wetness Class
Frequently Flooded
Frequently Flooded
Infrequently Flooded
Rarely Flooded
Retention Class
Strongly retentive (FS) (MS) (IS) (RS)
Moderately retentive (FM) (MM) (IM) (RM)
Poorly retentive (FP) (MP) (IP) (RP)
Non-retentive (FN) (MN) (IN) (RN)
Suitability Interpretation
High Quality (SI >/= 0.75)
Moderate Quality (SI >0.45 and <0.75)
Low Quality (SI </= 0.45)
Cottonwood-Dominate Shrubs (Poles and Saplings) - CTWSHRUB
Wetness Class
Frequently Flooded
Frequently Flooded
Infrequently Flooded
Rarely Flooded
Retention Class
Strongly retentive (FS) (MS) (IS) (RS)
Moderately retentive (FM) (MM) (IM) (RM)
Poorly retentive (FP) (MP) (IP) (RP)
Non-retentive (FN) (MN) (IN) (RN)
Suitability Interpretation
High Quality (SI >/= 0.75)
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Low Quality (SI </= 0.45)

USGS
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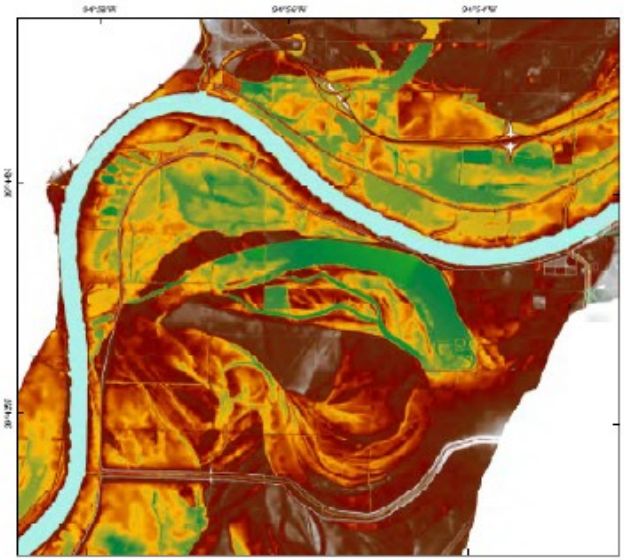
In cooperation with the U.S. Fish and Wildlife Service, Nebraska Game and Parks Commission, and The Nature Conservancy

Land Capability Potential Index (LCPI) for the Lower Missouri River Valley

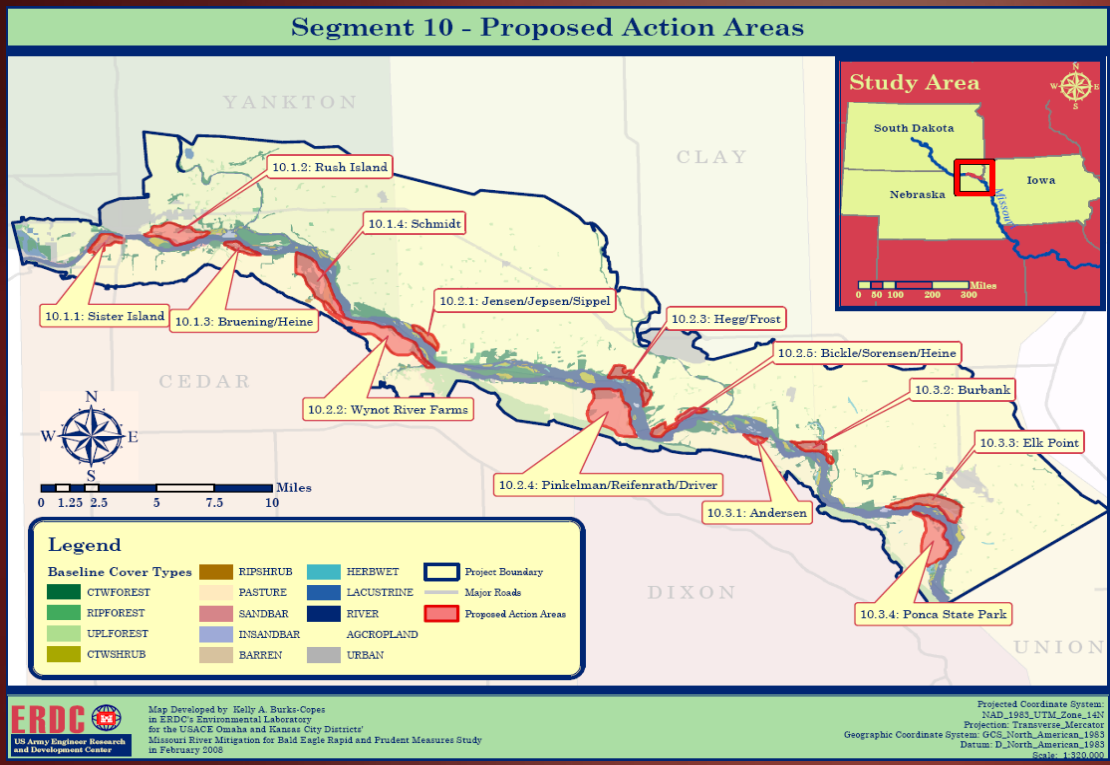


Scientific Investigations Report 2007–5256

U.S. Department of the Interior
U.S. Geological Survey

Using MCDA to Select Restoration Sites

- Site Selection Criteria
  - Depth to water table should be between ½ meter and 3 meters below ground surface.
  - Sites below the high bank are preferred.
  - Sites should be within the MNRR boundary.
  - Sites that overlap with existing or potential backwater restoration areas are favored.
  - Avoid T&E species site locations; give preference to sites adjacent to mainland.
  - Sites should be at least 40 acres in size.
  - Give priority to sites adjacent to existing young cottonwood stands.
  - Look for sites subject to periodic inundation.
  - Sites should not be in areas of active or likely erosion.
  - Favor sites that would otherwise risk development.



Where are we headed?